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MEMORANDUM REPORT ARCCB-MR-03001

BAUSCHINGER TEST FIXTURE

C. MOSSEY
E. TROIANO
F. PFINDEL

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US ARMY ARMAMENT RESEARCH,
DEVELOPMENT AND ENGINEERING CENTER
Close Combat Armaments Center
Benét Laboratories
Watervliet, NY 12189-4000

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C. Mossey, E. Troiano, and F. Pfindel

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Evaluating the Bauschinger effect on ASTM A723 gun steel necessitated the design and fabrication of a specialized fixture that remained rigid and properly aligned during testing. The configuration of the fixture can be easily modified to accommodate various specimen geometries and monitoring devices. This fixture did not allow specimen bending or buckling and was successful in obtaining accurate Bauschinger data.

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INTRODUCTION

The testing of ASTM A723 gun steel for Bauschinger effect made it necessary to design a unique fixturing device. The nature of the testing required that the specimen go through continuous tensile and compression loading cycles. Since the specimen experiences a complete reversal in the direction of the loading, it must be firmly supported and secured. This fixture (Figure 1) allowed the specimen to be precisely assembled in the device, remain in line with the loading axis of the test machine, and maintain a near zero bending load on the specimen. The configuration of the test fixture can easily be modified to accommodate specimens with configurations other than that shown in Figure 2.

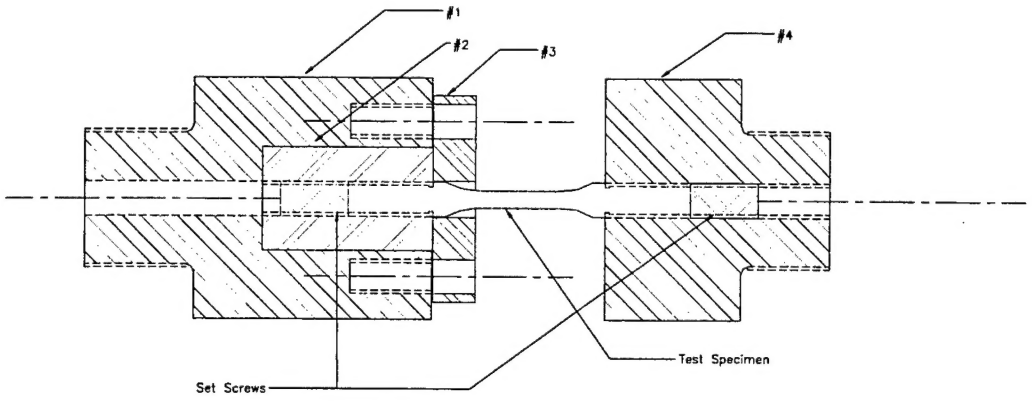

Figure 1. Bauschinger test fixture configuration.

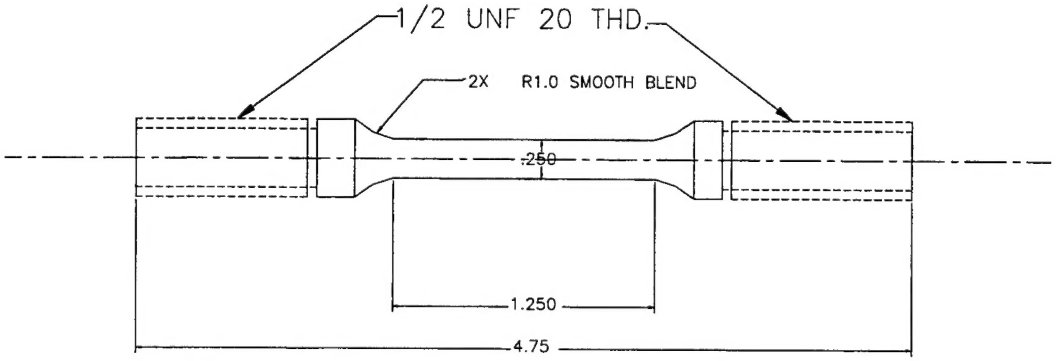

Figure 2. Test specimen configuration.

ASSEMBLY OF FIXTURE

The fixture base (part #1) is threaded into the actuator of the test machine. The specimen (Figure 2) is threaded into part #2 of the fixture to the desired depth. A setscrew is then threaded into part #2 from the opposite end and tightened against the specimen. Part #3 is slid over the specimen and the remaining end of the specimen is threaded in part #4. A setscrew is then threaded into the opposite end of part #4 and tightened against the specimen. Part #4 is threaded into the load cell of the testing machine. The actuator is raised until part #2 is bottomed out in part #1 (part #2 stands proud of #1). Finally, cap screws are used to secure the retainer plate (#3) to the fixture base (#1).

TEST PROCEDURE

With the test fixture and specimen in place a one-inch extensometer is secured to the specimen. Next the testing machine is run in a cyclic mode to the predetermined strain and number of cycles desired. The data are read into an Excel file, then plotted and analyzed.

SUMMARY

The fixture firmly held and aligned the specimen and did not allow it to bend or buckle as it went through continuous tensile and compressive loading cycles. The fixture made it possible to obtain accurate Bauschinger data.

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